UNITED STATES PATENT AND TRADEMARK OFFICE

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10/698,895	10/31/2003	Niranjan Damera-Venkata	200205808-1	2961

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EXAMINER
VO, QUANG N

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NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _26 November 2008_.
2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-25_ is/are pending in the application.
  4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) _1-25_ is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
  Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
  Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  a)☐ All b)☐ Some * c)☐ None of:
    1.☐ Certified copies of the priority documents have been received.
    2.☐ Certified copies of the priority documents have been received in Application No. _____.
    3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
  * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO/SB/08)
  Paper No(s)/Mail Date _____.
4)☐ Interview Summary (PTO-413)
  Paper No(s)/Mail Date. _____.
5)☐ Notice of Informal Patent Application
6)☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's election with traverse of restriction in the reply filed on 01/30/2008 is acknowledged. The traversal is on the ground(s) that the search and examination made without serious burden. This is found persuasive and the restriction cancelled.

Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 3-4, 8, 10-11, and 15-20,24 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 3, 8, 10, and 17 disclosing method/process manipulate only numbers, abstract concepts or ideas, or signals representing any of the foregoing, the acts are not being applied to appropriate subject matter. Gottschalk v. Benson, 409 U.S. 63, 71 - 72, 175 USPQ 673, 676 (1972). Thus, a process consisting solely of mathematical operations, i.e., converting one set of numbers into another set of numbers, does not manipulate appropriate subject matter and thus cannot constitute a statutory process.

Claim 4 is rejected because it depends on claim 3.

Claim 11 is rejected because it depends on claim 10.

Claim 18 is rejected because it depends on claims 17.

Claims 15-20, and 24 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claim 15 is drawn to functional descriptive material NOT claimed as residing on a computer readable medium. MPEP 2106.IV.B.1 (a) (Functional Descriptive Material) states:

"Data structures not claimed as embodied in a computer-readable medium are descriptive material per se and are not statutory because they are not capable of causing functional change in the computer."

"Such claimed data structures do not define any structural or functional interrelationships between the data structure and other claimed aspects of the invention which permit the data structure's functionality to be realized."

Claim 15, while defining a program, does not define a "computer-readable medium" and is thus non-statutory for that reasons. A program can range from paper on which the program is written, to a program simply contemplated and memorized by a person. The examiner suggests amending the claim to embody the program on "computer-readable medium" in order to make the claim statutory.

Claims 16-20, 24 are rejected because it depends on claim 15.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 4, 6-7, 9, 11, 13-14, 21, 23 and 25 are rejected under 35

U.S.C. 102(b) as being anticipated by Kumar et al. (Kumar) (On the Phase Response of

the Error Diffusion Filter for Image Halftoning, September 1999).

Regarding claim 1, Kumar discloses an error diffusion halftoning method (e.g.,

error diffusion method, figure 1) comprising: modifying a current input to produce a

modified input (e.g., converting a gray tone $f(i, j)$ to $y(i, j)$ (modified input), figure 1,

paragraph I), wherein the modifying comprises incorporating past quantization errors

into the current input (e.g., past errors $d(i, j)$ into $f(i, j)$ to have modified input $y(i, j)$, figure

1, paragraph I); quantizing the modified input to produce an output (e.g., converting $y(i,$

$j)$ (modified input) to a binary value $g(i, j)$ for output, figure 1, paragraph I); and

processing the output through a data processing path having a bandpass transfer

characteristic (e.g., error filter $h(k, l)$ (transfer function) with preferably with its pass band

not less than the passband of the human visual system, figure1, page 1285, third

paragraph), wherein the processing comprises deriving an error value (e.g., error value

$e(i, j)$, figure 1) from the modified input (e.g., modified input $y(i, j)$, figure 1) and the

output and diffusing the error value into future inputs (e.g., diffusing the error value $d(i, j)$

into future inputs $f(i, j)$, figure 1).

Regarding claim 2, Kumar discloses wherein the processing comprises shaping

quanfization noise in the output in accordance with the bandpass transfer characteristic

(e.g., the resulting halftoning noise does get shaped in a desirable way; the halftoning

noise spectrum is shaped by 1-H(w(x), w(y)), Proposed Algorithm and Halftoning Noise

in Error Diffusion, page 1283).

Regarding claim 4, Kumar discloses wherein coefficients of the transfer functions

H(z) and K(z) sum to unity at dc and the bandpass transfer function has a mean-

preserving behavior (e.g., If the magnitude response of the error filter is lowpass with

unity gain at zero frequency, Magnitude Versus Phase, pages1284, 1289).

Regarding claim 6, Kumar disclose wherein the processing comprises bandpass

filtering the error value into future inputs (e.g., error filter h(k, l) (transfer function) with

preferably with its pass band not less than the passband of the human visual system,

figure1, page 1285, third paragraph).

Referring to claim 7:

Claim 7 is the apparatus claim corresponding to method step in claim 1 with

functional steps corresponding directly to the method step elements in claim 1.

Therefore claim 7 is rejected as set forth above for claim 1.

Referring to claim 9:

Claim 9 is the apparatus claim corresponding to method step in claim 1 with

functional steps corresponding directly to the method step elements in claim 1.

Therefore claim 9 is rejected as set forth above for claim 1.

Referring to claim 11:

Claim 11 is the apparatus claim corresponding to method step in claim 4 with

functional steps corresponding directly to the method step elements in claim 4.

Therefore claim 11 is rejected as set forth above for claim 4.

Referring to claim 13:

Claim 13 is the apparatus claim corresponding to method step in claim 6 with

functional steps corresponding directly to the method step elements in claim 6.

Therefore claim 13 is rejected as set forth above for claim 6.

Referring to claim 14:

Claim 14 is the apparatus claim corresponding to method step in claim 2 with

functional steps corresponding directly to the method step elements in claim 2.

Therefore claim 14 is rejected as set forth above for claim 2.

Regarding claim 21, Kumar discloses a printer comprising: a print engine; and a

processor (e.g., printer/display (inherently having print engine and processor), page

1282) for performing error diffusion halftoning (e.g., error diffusion method, figure 1), the

halftoning including performing quantization (e.g., quantizer, figure 1), and using an

error signal filtered with an effective bandpass characteristic to influence the

quantization without using a result of the quantization to directly influence an input of the

quantization characteristic (e.g., error filter h(k, l) (transfer function) with preferably with

its pass band not less than the passband of the human visual system, figure1, page

1285, third paragraph), an output of the quantization supplied to the print engine (e.g.,

binary output g(i, j) supplied to the print engine, figure 1).

Regarding claim 23, Kumar discloses wherein the modifying comprises

incorporating into the current input (e.g., x(n1, n2), figure 2) the past quantization errors

filtered in accordance with a bandpass filter transfer function (e.g., error filter h(k, l)

(transfer function) with preferably with its pass band not less than the passband of the

human visual system, figure1, page 1285, third paragraph) to produce the modified

input (e.g., past errors d(i, j) into f(i, j) to have modified input y(i, j), figure 1, paragraph

I), and subtracting the modified input (e.g., modified input y(i, j), figure 1) from the output

(e.g., output g(i, j), figure 1) to produce the error value (e.g., error e(i, j), figure 1).

Regarding claim 25, Kumar discloses wherein the processor (e.g., printer/display

(inherently have processor), page 1282) is operable to perform operations comprising:

modifying a current input (e.g., current input f(i, j), figure 1) to produce a modified input

(e.g., modified input y(i, j), figure 1), wherein the modifying comprises incorporating past

quantization errors into the current input (e.g., quantization errors d(i, j), figure 1);

quantizing the modified input to produce an output (e.g., output g(i, j), figure 1); and

processing the output through a data processing path having a bandpass transfer

characteristic (e.g., error filter h(k, l) (transfer function) with preferably with its pass band

not less than the passband of the human visual system, figure1, page 1285, third

paragraph), wherein the processing comprises deriving an error value from the modified

input and the output and diffusing the error value into future inputs (e.g., diffusing the

error value d(i, j) into future inputs f(i, j), figure 1).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

Claims 5, 12, 15-16, 18-20, 22 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar et al. (Kumar) (On the Phase Response of the Error Diffusion Filter for Image Halftoning, September 1999) as applied to claim 1 above, and further in view of Shimizu (US 6,999,201).

Regarding claim 5, Kumar does not explicitly disclose generating second error value based on the filtered output and the modified input and low pass filtering the second error value with a second linear weighting filter to produce the first error value.

Shimizu disclose generating second error value (e.g., w(n1,n2), figure 2) based on the filtered output (e.g., g(n1,n2), figure 2) and the modified input (e.g., modified input at 215, figure 2) and low pass filtering the second error value with a second linear weighting filter (e.g., weight coefficient lamda block 280 and associated with adaptive algorithm block 270, figure 2. Note: weight coefficient associated with adaptive algorithm to produce the quantization error e(n1, n2). Thus it is considered as second linear weighting filter) to produce the first error value (e.g., e(n1, n2) at 285, figure 2).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Kumar to include generating second error value based on the filtered output and the modified input and low pass filtering the second error value with a second linear weighting filter to produce the first error value as taught by Shimizu. It would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Kumar by the teaching of Shimizu to obtain more accurate error values for error diffusion processing.

Referring to claim 12:

Claim 12 is the apparatus claim corresponding to method step in claim 5 with functional steps corresponding directly to the method step elements in claim 5. Therefore claim 12 is rejected as set forth above for claim 5.

Regarding claim 15, Kumar discloses a processor (e.g., printer/display (inherently having processor), page 1282) to perform error diffusion halftoning (e.g., error diffusion method, figure 1), the error diffusion halftoning including performing quantization (e.g., quantizer, figure 1), and filtering (e.g., error filter, figure 1) with an effective bandpass characteristic without using an output of the quantization to directly influence an input of the quantization (e.g., error filter h(k, l) (transfer function) with preferably with its pass band not less than the passband of the human visual system, figure1, page 1285, third paragraph).

Kumar does not explicitly disclose an article for a processor, the article comprising memory encoded with data for instructing the processor to perform error diffusion halftoning.

Shimizu disclose an article for a processor, the article comprising memory encoded with data for instructing the processor to perform error diffusion halftoning (e.g., The processing for this invention can be carried out by a computer program. This computer program can be executed by a computer system shown in FIG. 12).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Kumar to include an article for a processor, the article comprising memory encoded with data for instructing the processor to perform error diffusion halftoning as taught by Shimizu. It would have been obvious to one of ordinary

skill in the art at the time of the invention to have modified Kumar by the teaching of

Shimizu to conveniently process error diffusion halftoning from software program.

Regarding claim 16, Kumar discloses wherein the filtered error signal is used to

modify the quantization input (e.g., Error filter used to modify y(i, j), figure 1).

Regarding claim 18, Kumar discloses wherein coefficients of the transfer

functions H(z) and K(z) sum to unity at dc (e.g., If the magnitude response of the error

filter is lowpass with unity gain at zero frequency, Magnitude Versus Phase, pages1284,

1289).

Regarding claim 19, Kumar differs from claim 19 in that he does not explicitly

disclose and low pass filtering the error signal with a second linear weighting filter.

Shimizu discloses low pass filtering the error signal with a second linear

weighting filter (e.g., weight coefficient lamda block 280 and associated with adaptive

algorithm block 270, figure 2. Note: weight coefficient associated with adaptive

algorithm to produce the quantization error e(n1, n2). Thus it is considered as second

linear weighting filter).

Therefore it would have been obvious to one of ordinary skill in the art at the time

of the invention to have modified Kumar to include low pass filtering the error signal with

a second linear weighting filter as taught by Shimizu. It would have been obvious to one

of ordinary skill in the art at the time of the invention to have modified Kumar by the

teaching of Shimizu to obtain more accurate error values for error diffusion processing.

Regarding claim 20, Kumar discloses wherein the filtering includes generating an error from the quantization input and output (e.g., error e(i, j) generating from y(i, j) and g(i, j), figure 1); and applying an infinite impulse response filter to the error signal (e.g., error filter to error signal e(i, j), figure 1, an output of the infinite impulse response filter used to modify the quantization input (e.g., output from error filter d(i, j) to y(i, j), figure 1).

Regarding claim 22, Kumar differs from claim 22 in that he does not disclose subtracting the modified input from the modified output to produce a second error value filtering the second error value in accordance with a second low-pass filter transfer function to produce the first error value; and
the modifying comprises incorporating into the current input past error values filtered in accordance with the second low-pass filter transfer function to produce the modified input.

Shimizu discloses subtracting the modified input (e.g., modified input at 215, figure 2) from the modified output (e.g., g(n1, n2) or value at 245, figure 2) to produce a second error value (e.g., w(n1,n2), figure 2) filtering the second error value in accordance with a second low-pass filter transfer function to produce the first error value (e.g., weight coefficient lamda block 280 and associated with adaptive algorithm block 270, figure 2. Note: weight coefficient associated with adaptive algorithm to produce the quantization error e(n1, n2). Thus it is considered as second linear weighting filter) to produce the first error value (e.g., e(n1, n2) at 285, figure 2); and the modifying comprises incorporating into the current input (e.g., current input x(n1, n2),

figure 2) past error values filtered (e.g., e(n1, n2) at 285, figure 2) in accordance with

the second low-pass filter transfer function to produce the modified input (e.g., modified

input at 215, figure 2).

Therefore it would have been obvious to one of ordinary skill in the art at the time

of the invention to have modified Kumar to include subtracting the modified input from

the modified output to produce a second error value filtering the second error value in

accordance with a second low-pass filter transfer function to produce the first error

value; and the modifying comprises incorporating into the current input past error values

filtered in accordance with the second low-pass filter transfer function to produce the

modified input as taught by Shimizu. It would have been obvious to one of ordinary skill

in the art at the time of the invention to have modified Kumar by the teaching of Shimizu

to obtain more accurate error values for error diffusion processing.

Regarding claim 24, Kumar differs from claim 24 in that he does not disclose the

article stores processor-readable instructions causing the processor to perform error

diffusion operations.

Shimizu discloses the article stores processor-readable instructions causing the

processor to perform error diffusion operations (e.g., The processing for this invention

can be carried out by a computer program. This computer program can be executed by

a computer system shown in FIG. 12).

Therefore it would have been obvious to one of ordinary skill in the art at the time

of the invention to have modified Kumar to include an article for a processor, the article

comprising memory encoded with data for instructing the processor to perform error

diffusion halftoning as taught by Shimizu. It would have been obvious to one of ordinary

skill in the art at the time of the invention to have modified Kumar by the teaching of

Shimizu to conveniently process error diffusion halftoning from software program.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Quang N. Vo whose telephone number is (571)270-

1121. The examiner can normally be reached on 7:30AM-5:00PM Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, David K. Moore can be reached on (571)272-7437. The fax phone number

for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

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system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Q. N. V./
Examiner, Art Unit 2625

/David K Moore/

Supervisory Patent Examiner, Art Unit 2625